MISSIONS AND MEANS FRAMEWORK (MMF)
Demo Status

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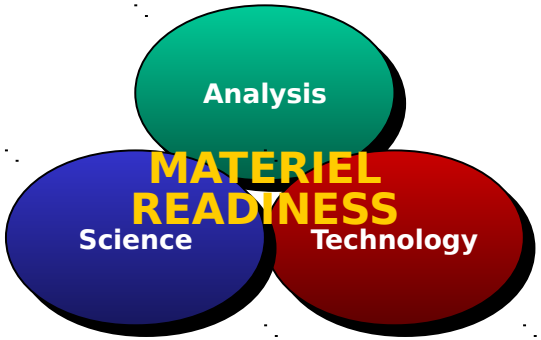
T&E SUMMIT V
February 20, 2004



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OVERVIEW

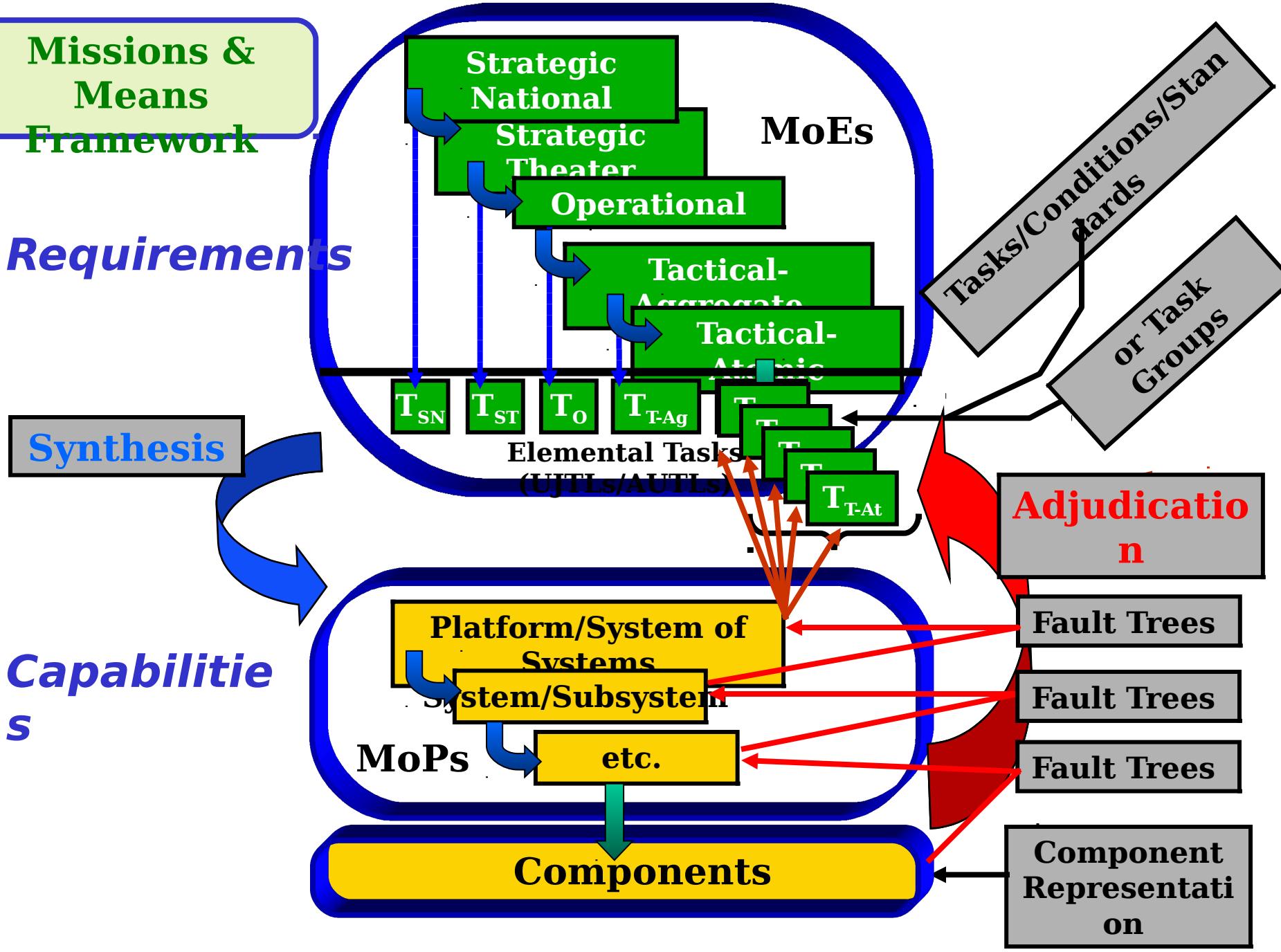
- *The Missions and Means Framework (MMF) is used to establish required tasks for an FCS mission.*

- *Mathematical Fault Trees are used to model the capabilities of the surviving FCS SoS.*

- *ARL-SLAD will compare residual SoS capability against required tasks to assess mission accomplishment.*

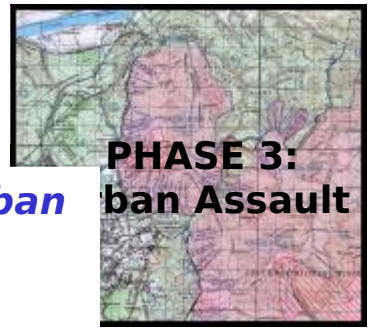
- *A future demonstration will show how this approach may be applied to examine materiel solutions for accomplishing FCS missions.*

Missions & Means Framework



Mission Decomposition:

"First the synthesis, now the execution"



MISSION: ***On order, attack to defeat Rebel forces and secure urban stronghold northeast of OBJ CAMEL.***

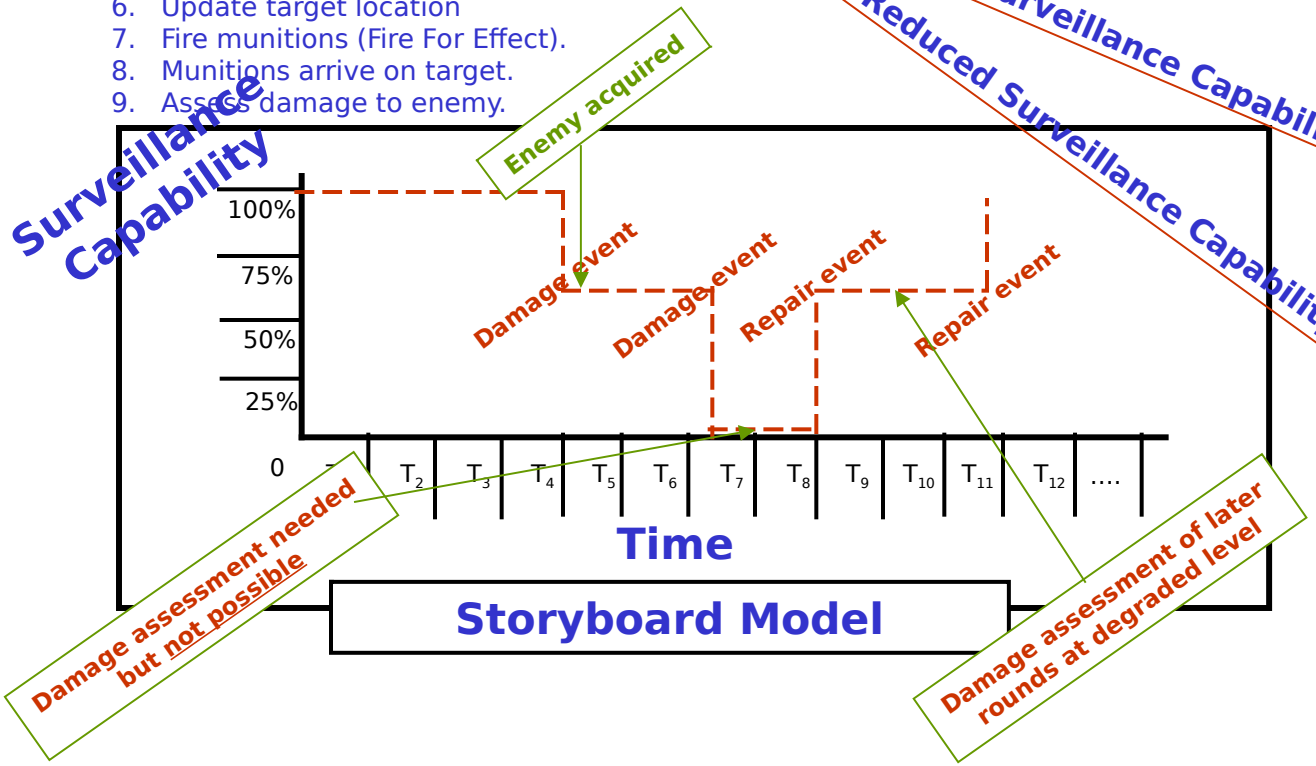
COMMANDER'S INTENT: ***Control ingress/egress of city by enemy.***

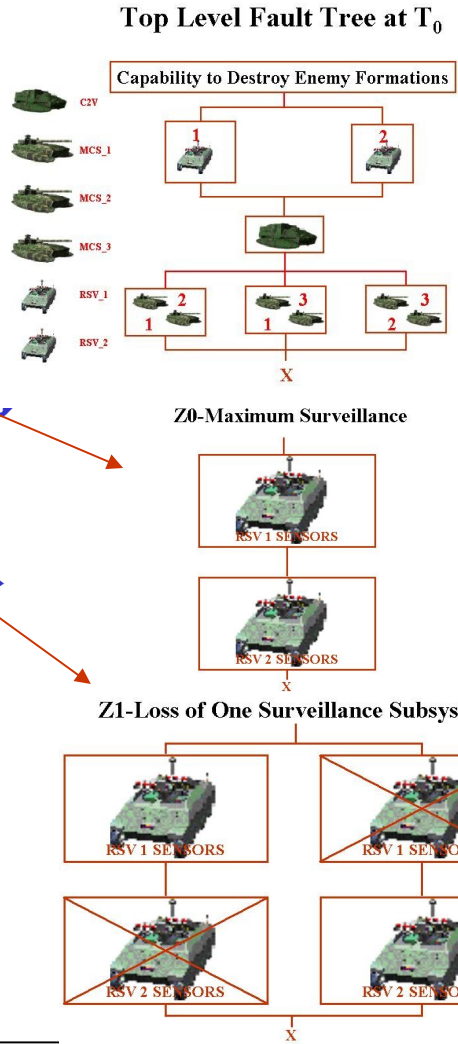
TIMED SEQUENCE OF EVENTS/TASKS:

1. Move into position
   a. Reconnaissance Surveillance Vehicle (RSV) observe Target Areas of Interest
   b. Mounted Combat System (MCS) to target range area
2. **Maintain surveillance. (sensor capability)** ← example
3. Acquisition Report to C2V.
4. Clearance of fires (Situational Awareness).
5. Call for fire from C2V to shooters (Adjusted Fire).
6. Update target location
7. Fire munitions (Fire For Effect).
8. Munitions arrive on target.
9. Assess damage to enemy.

Maximum Surveillance Capability

Reduced Surveillance Capability





Expected Products

Storyboard Model

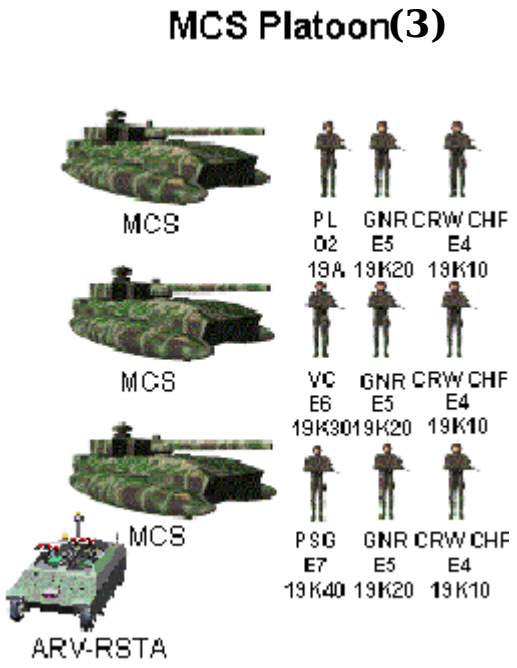
- ✓Executes a simple vignette of short duration
- ✓Required tasks vary with phase of vignette
- ✓Available capabilities vary during vignette as SoS take damage, suffers failures, and is repaired
- ✓Capabilities are compared to required tasks to determ mission accomplishment.

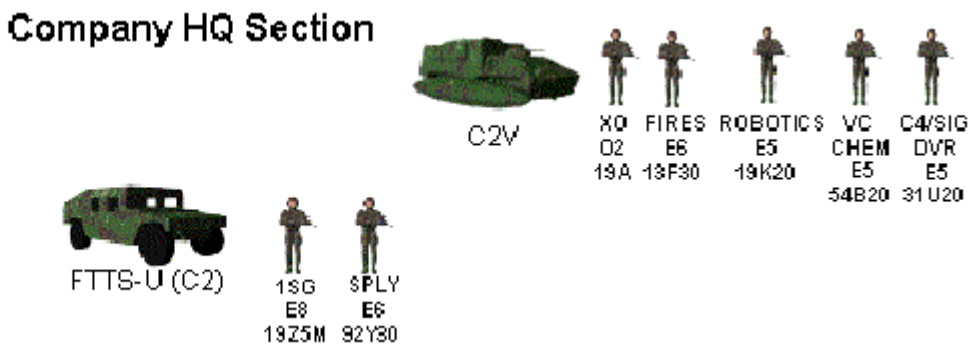
BACKUP

Mounted Combat System (MCS)*

MCS Company mission.
To close with and destroy enemy forces, using fire and maneuver and tactical assault. Optimized for extended LOS and BLOS fires and employs chemical energy (CE) and kinetic energy (KE) munitions to engage at standoff as well as provide rapid gun fires required fo contact or during tactical assaults. Attacks or defends under hostile fire and visibility conditions. This unit is optimized for high-speed mobile operations a required lethality to kill main battle tanks (MBT) with enhanced reactive arm protective systems. Each MCS is operated with a 3-man crew with the ability fourth soldier.

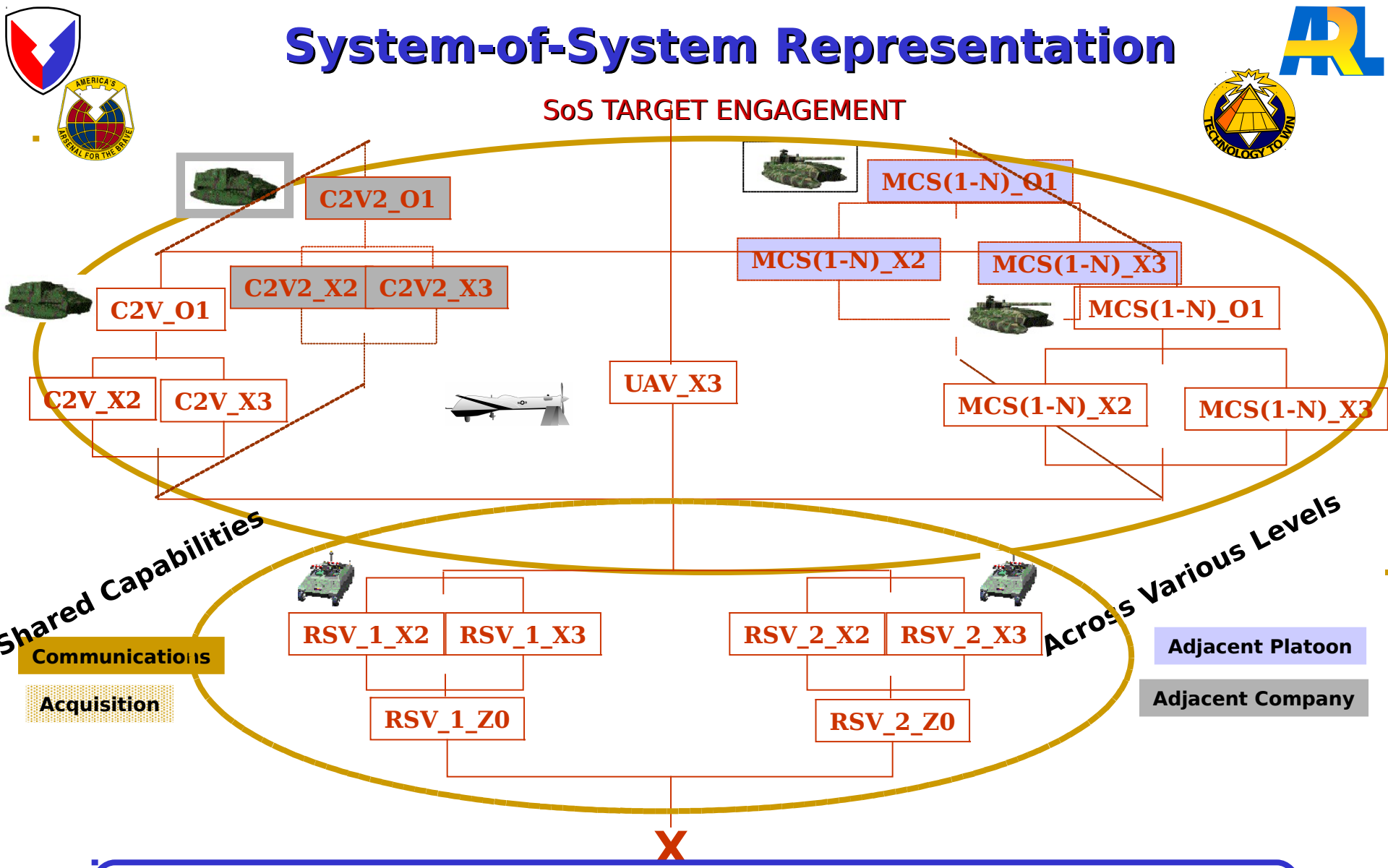
MCS Company Tasks:
- Execute fire and maneuver before contact, in contact, and during tactical a to close with and destroy the enemy.
- Provide mutual support in overwatch and cooperative engagements.
- Conduct offensive, defensive, stability and support operations in all terrain
- Conduct reconnaissance and surveillance operations (zone, area, route).
- Conduct security operations (counter-reconnaissance).
- Fire munitions that will accurately destroy low and slow moving enemy air





* TRADOC PAM 525-3-90, OF Operational and Organizational Plan

System-of-System Representation



System-of-System capabilities required are communications and situational awareness.

MCS Company Attack*

Mission: (U) MCS Company Attack (164 task(s))
Mission Task: ART 2.0 The Maneuver Battlefield Operating System
Command-Linked Task: MTP 17-2-0219.17-00DT ATTACK BY FIRE

Supporting Task: MTP 17-2-0219.17-00DT ATTACK BY FIRE
Description: While conducting tactical operations, the troop has made contact with a moving or station
The troop conducts an attack by fire IAW the OPORD/FRAGO or its higher unit commander. Additional m
and CS assets (e.g., air, engineer and intelligence) may be available to the troop. Your unit may be digi
The troop maneuvers to and occupies an attack-by-fire (ABF) position. It places effective direct fires an
indirect fires on the enemy, destroying it or causing it to withdraw. If digital equipment is available, th
necessary or as directed to accomplish the mission. No friendly unit suffers casualties or equipment da
as a result to fratricide. (OPERATIONS)

Standards

M#	Criterion	Scale	Measure
	(U)	Meters	(U) Accuracy of indirect fires
	(U)	Minutes	(U) Response time from target identification and location
	(U)	Number	(U) Friendly casualties sustained
	(U)	Minutes	(U) Time to move into attack fire position

* DYNAMICS RESEARCH CORPORATION

StoryBoard Model

Purpose: demonstrating mission/task success/failure as a function of low-level component state.

What it IS:

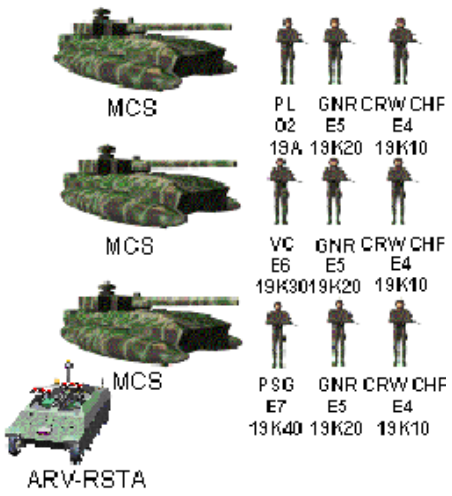
* A minimal model to demonstrate that
    1. Low-level component damage can be mapped to platform capabili
    2. platform capabilities can be mapped to SoS ability to perform task
    3. the completion or failure of the constituent tasks determines the success or failure of the mission.
* The term “StoryBoard” is an analogy to movie making; set the scene ar play it out, focusing on the “star actors” but don’t worry about the off stage details.

What it ISN’T:

* Not a two-sided combat simulation or war game.
* Very low resolution in most aspects.

Background Definitions:
Degraded Capability State

Level 2-3 data



Mobility
M0 No Mobility Degradation
M1 Reduced Maximum Speed
M2 Reduced Maneuverability
M3 Stop After Time t
M4 Total Immobilization

Firepower
F0 No Firepower Degradation
F1 Reduced Delivery Accuracy While Moving
F2 Reduced Delivery Accuracy of Main Armament
F3 Reduced Initial Rate of Fire of Main Armament
F4 Reduced Subsequent Rate of Fire of Main Armament
F5 Loss of Main Armament
F6 Reduced Delivery Accuracy of Secondary Armament
F7 Reduced Initial Rate of Fire of Secondary Armament
F8 Reduced Subsequent Rate of Fire of Secondary Armament
F9 Loss of Secondary Armament
F10 Loss of Tertiary Armament
F11 Loss of Fourth Armament

Target Acquisition
A0 No Acquisition Degradation
A1 Loss of Acquisition System 1
A2 Loss of Acquisition System 2
A3 Loss of Acquisition System 3
A4 Loss of Acquisition System 4

Surveillance
Z0 No Surveillance Degradation
Z1 Loss of Surveillance System 1
Z2 Loss of Surveillance System 2

Communication
X0 No Communication Degradation
X1 Reduced Range of External Communicati
X2 Loss of External Voice
X3 Loss of External Data
X4 Loss of Internal Communication

Survivability
S0 No Survivability Degradation
S1 Loss of Survivability System 1
S2 Loss of Survivability System 2
S3 Loss of Survivability System 3
S4 Loss of Survivability System 4
S5 Loss of Survivability System 5
S6 Loss of Survivability System 6

Crew
C0 No Crewmember Incapacitated
C1 Commander Incapacitated
C2 Gunner Incapacitated
C3 Driver Incapacitated
C4 Loader Incapacitated
C5 Equipment Operator Incapacitated

Passengers
P0 No Passengers Incapacitated
P1 Passengers Incapacitated

Other
01 Situational Awareness

Catastrophic Loss
K0 No Catastrophic Loss
K1 Catastrophic Loss

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Planned Storyboard Outputs

- Probability of SoS available capability and task comple

- Average number of components/subsystems killed before capability level falls below requirement.

- Key elements driving failure.

- Insights to force-level data analysis techniques.